

What is claimed is:

1. A method for open surgical endarterectomy, comprising the steps of:

providing an elongate member having a proximal end, a distal end, and an expandable filter at the distal end;

inserting the distal end of the elongate member into the internal carotid artery downstream of a lesion;

expanding the filter;

advancing a tubular member having proximal and distal ends over the elongate member to place the distal end of the tubular member within the internal carotid artery;

inserting the proximal end of the tubular member into the common carotid artery upstream of the lesion; and

flowing blood from the common carotid artery through a lumen of the tubular member into the internal carotid artery.

2. The method of claim 1, wherein the elongate member comprises a wire.

3. The method of claim 1, wherein the filter is fixedly mounted on the elongate member.

4. The method of claim 1, wherein the filter is slideably mounted on the elongate member.

5. The method of claim 1, wherein the elongate member further comprises a sheath covering the filter, and wherein the method further comprises the step of withdrawing the sheath to release the filter.

6. The method of claim 1, wherein the filter comprises a plurality of flexible struts, each strut bonded to the elongate member at a proximal end, and each strut having a distal end slideably mounted on the elongate member.

5 7. The method of claim 1, further comprising the steps of occluding the common carotid artery upstream of the lesion and occluding the internal carotid artery downstream of the lesion.

10 8. The method of claim 7, wherein the common carotid artery and internal carotid artery are occluded by clamping.

15 9. The method of claim 1, further comprising the step of back-bleeding the tubular member to purge air.

20 10. The method of claim 7, further comprising the step of making an arteriotomy to access the lesion.

25 11. The method of claim 10, further comprising the step of removing the lesion by endarterectomy.

30 12. The method of claim 10, further comprising the step of suturing to close the arteriotomy.

35 13. The method of claim 12, further comprising the steps of removing occlusion from the common carotid and internal carotid arteries.

40 14. The method of claim 12, further comprising the step of removing the proximal and distal ends of the tubular member while maintaining the filter in the internal carotid artery.

15. The method of claim 12, further comprising the steps of collapsing and removing the filter.

16. The method of claim 5, further comprising the steps of advancing the sheath distally over the elongate member to cover the filter, and removing the elongate member and sheath from the internal carotid artery.

17. The method of claim 10, further comprising the step of flushing the lesion with saline.

18. The method of claim 7, further comprising the step of occluding the external carotid artery.

19. The method of claim 1, further comprising the step of making an incision on the internal carotid artery.

20. The method of claim 10, further comprising the step of applying a patch graft to close the arteriotomy.

21. The method of claim 12, further comprising the step of removing the filter while maintaining the tubular member in the internal carotid artery.

22. The method of claim 1, wherein the tubular member has a port between the proximal and distal ends, and wherein the elongate member is passed through the port as the tubular member is advanced over the elongate member.

23. The method of claim 22, wherein the port includes a hemostatic valve.

24. The method of claim 18, further comprising the step of measuring the blood pressure in the internal carotid artery before occluding the common and the external carotid arteries.

25. A method for open surgical endarterectomy, comprising the steps of:

providing an elongate member having a proximal end, a distal end, and an expandable filter at the distal end;

5 inserting the distal end of the elongate member into the internal carotid artery downstream of a lesion;

expanding the filter;

10 advancing a first tubular member having proximal and distal ends over the elongate member to place the distal end of the first tubular member within the internal carotid artery;

inserting a proximal end of a second tubular member into the common carotid artery upstream of the lesion;

15 joining the distal end of the second tubular member to the proximal end of the first tubular member; and

flowing blood from the common carotid artery through a lumen of the tubular member into the internal carotid artery.

26. The method of claim 25, wherein the elongate member comprises a wire.

27. The method of claim 25, wherein the filter is fixedly mounted on the elongate member.

28. The method of claim 25, wherein the filter is slideably mounted on the elongate member.

29. The method of claim 25, wherein the elongate member further comprises a sheath covering the filter, and wherein the method further comprises the step of withdrawing the sheath to release the filter.

30. The method of claim 25, wherein the filter comprises a plurality of flexible struts, each strut bonded to the elongate member at a proximal end, and each strut having a distal end slideably mounted on the elongate member.

5 31. The method of claim 25, further comprising the steps of occluding the common carotid artery upstream of the lesion and occluding the internal carotid artery downstream of the lesion.

10 32. The method of claim 31, wherein the common carotid artery and internal carotid artery are occluded by clamping.

33. The method of claim 25, further comprising the step of back-bleeding the tubular member to purge air.

15 34. The method of claim 31, further comprising the step of making an arteriotomy to access the lesion.

20 35. The method of claim 34, further comprising the step of removing the lesion by endarterectomy.

36. The method of claim 34, further comprising the step of suturing to close the arteriotomy.

25 37. The method of claim 36, further comprising the steps of removing occlusion from the common carotid and internal carotid arteries.

30 38. The method of claim 36, further comprising the step of removing the proximal and distal ends of the tubular member while maintaining the filter in the internal carotid artery.

39. The method of claim 36, further comprising the steps of collapsing and removing the filter.

40. The method of claim 29, further comprising the steps of advancing the sheath distally over the elongate member to cover the filter, and removing the elongate member and sheath from the internal carotid artery.

41. The method of claim 34, further comprising the step of flushing the lesion with saline.

42. The method of claim 31, further comprising the step of occluding the external carotid artery.

43. The method of claim 25, further comprising the step of making an incision on the internal carotid artery.

44. The method of claim 34, further comprising the step of applying a patch graft to close the arteriotomy.

45. The method of claim 36, further comprising the step of removing the filter while maintaining the tubular member in the internal carotid artery.

46. The method of claim 25, wherein the tubular member has a port between the proximal and distal ends, and wherein the elongate member is passed through the port as the tubular member is advanced over the elongate member.

47. The method of claim 46, wherein the port includes a hemostatic valve.

48. A method for open surgical endarterectomy, comprising the steps
of:

providing an elongate member having a proximal end, a distal end, an
expandable filter at the distal end, and a slideable sheath covering the filter;
making an incision on the internal carotid artery downstream of a lesion;
inserting the distal end of the elongate member through the incision;
withdrawing the sheath from the filter;
expanding the filter downstream of the lesion;
occluding the external carotid artery, common carotid artery, and
10 internal carotid artery to isolate a region of the internal carotid artery with the lesion;
performing endarterectomy to remove the lesion; and
removing occlusion from the external carotid artery, common carotid
artery, and internal carotid artery, wherein embolic material is captured by the filter.

15 49. The method of claim 48, further comprising the steps of flushing
and aspirating embolic material from the region.

50. The method of claim 48, wherein the endarterectomy is
performed through an arteriotomy on the internal carotid artery.

20 51. The method of claim 50, further comprising the step of suturing
to close the arteriotomy.

25 52. The method of claim 50, further comprising the step of applying
a patch to close the arteriotomy.

53. The method of claim 48, wherein the endarterectomy is
performed through an arteriotomy on the internal carotid artery.

54. The method of claim 48, wherein the external carotid, common carotid, and internal carotid arteries are occluded by clamping.

55. The method of claim 48, wherein the elongate member comprises
5 a wire.

56. The method of claim 48, wherein the filter is fixedly mounted on the elongate member.

57. The method of claim 48, wherein the filter is slideably mounted
10 on the elongate member.

58. The method of claim 48, wherein the filter comprises a sheath covering the filter, and wherein the method further comprises the step of withdrawing
15 the sheath to release the filter.

59. The method of claim 48, further comprising the steps of collapsing and removing the filter.

60. The method of claim 58, further comprising the steps of
20 advancing the sheath distally over the elongate member to cover the filter, and removing the elongate member and sheath from the internal carotid artery.

61. A medical device for open surgical endarterectomy, comprising:
a first tubular member having a proximal end, a distal end, and a lumen
therebetween communicating with a distal port, a first proximal port, and a second
proximal port;
5 a hemostatic valve mounted in the second proximal port;
a second tubular member having a proximal end, a distal end, and a
lumen therebetween, the distal end of the second tubular member adapted for releasable
attachment to the first proximal port of the first tubular member; and
an elongate member inserted through the hemostatic valve and the second
10 proximal port, the elongate member having a proximal end, a distal end, and an
expandable filter at the distal end.

62. The medical device of claim 61, wherein the elongate member
further comprises a slideable sheath covering the filter.

63. The medical device of claim 61, wherein the distal end of the first
tubular member includes a plurality of ports.

64. The medical device of claim 61, wherein the proximal end of the
20 second tubular member includes a plurality of ports.

65. The medical device of claim 61, wherein an expandable balloon is
mounted on the distal end of the first tubular member.

25 66. The medical device of claim 61, wherein an expandable balloon is
mounted on the proximal end of the second tubular member.

67. The medical device of claim 66, wherein the balloon is a toroidal
balloon.

30 68. The medical device of claim 66, wherein the balloon
communicates with an inflation lumen.

69. The medical device of claim 61, wherein the first tubular member further comprises a valve for regulating blood flow.

5 70. The medical device of claim 61, wherein the second tubular member further comprises a valve for regulating blood flow.

71. The medical device of claim 61, wherein the first tubular member further comprises a lumen adapted for irrigation and aspiration.

10 72. The medical device of claim 71, wherein the lumen communicates with a plurality of aspiration ports.

15 73. The medical device of claim 61, wherein the distal end of the first tubular member includes a suture flange.

74. The medical device of claim 61, wherein the proximal end of the second tubular member includes a suture flange.

20 75. The medical device of claim 61, wherein the distal end of the first tubular member includes a manometer.

25 76. The medical device of claim 61, wherein the distal end of the filter includes an atraumatic tip.

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77. A shunt, comprising:
an elongate tubular member having a proximal end, a distal end, and a
lumen therebetween;
an expandable filter mounted on the distal end of the shunt; and
a sheath slideably disposed about the distal end of the elongate tubular
member and covering the filter,
wherein the sheath is retractable to release the filter.

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78. The shunt of claim 77, further comprising a balloon mounted on
the elongate tubular member distal the filter.

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79. The shunt of claim 77, wherein the elongate tubular member
contains a recess shaped to receive the filter when the filter is closed.

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80. The shunt of claim 78, wherein the balloon communicates with an
inflation lumen.

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81. The shunt of claim 77, further comprising a balloon mounted on
the proximal end of the elongate tubular member.

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82. The shunt of claim 78, wherein the shunt further includes a
plurality of aspiration ports proximal the balloon.

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83. The medical device of claim 77, wherein the distal end of the
filter includes a manometer.

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84. The method of claim 48, wherein endarterectomy is performed
through the incision on the internal carotid artery downstream of a lesion through which
the distal end of the elongate member is inserted.

85. The method of claim 48, further comprising the step of making a second incision on the internal carotid artery, wherein endarterectomy is performed through the second incision on the internal carotid artery.

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